A Discourse on

Resource and Recreation Roads

Manitoba
Natural Resources
Resource Allocation
and Planning

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Manitoba
Department of Natural Resources
Resource Allocation and Planning Branch

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Summary

The purpose of this report is to describe a management strategy for resource and recreation roads which are administered by the Department of Natural Resources in Manitoba. There are more than 2500 kilometres of these roads in the Province, with more added each year.

The strategy presented herein sets out procedures which build upon those existing practices proven to be most effective. An easily understood road classification is described. Construction standards are defined. Maintenance and upgrading guidelines and evaluation procedures are outlined. Recommendations for mapping, posting, signing and publication are made.

Acknowledgements

Many people throughout the Department contributed background information to this study. In particular, the assistance of the local managers of the Regional Services Branch, and regional field staff in providing review and comment has rendered the strategy more practical in its application to road management problems.

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1. Introduction

The Department of Natural Resources operates an extensive network of major resource and recreation roads, which at last count totalled at least 2,500km. About 40% of this road system is located in the Southeastern Region. Table #1 provides an estimate of major road facilities which represents only a portion of the total resource road network.

Table 1. Estimate of Major Resource and Recreation Roads (1982) by Department of Natural Resources Administrative Region.

Region	Est. Distance in km
Eastern	233
Northwest	71
Western	514
Interlake	445
Southeast	1040
Southwest	108
Northern	66
Total	2477

Purpose of Discourse

The purposes of this discourse are:

- to set out, for implementation, a management strategy for all resource and recreation roads.
- to describe a classification system which can be applied to departmental roads.
- to describe basic road standards for construction.
- to describe maintenance standards.
- to describe a process which will assist the department in the allocation of limited road expenditure dollars for maintenance and up-grading.
- to set out a map record or inventory file system for resource roads.

Scope of Study

For the purposes of this discourse, a resource and recreation road is considered to be any road, surveyed or unsurveyed, recorded in the Crown Land Registry or not, which is administered by the Department of Natural Resources. This would include roads built and maintained by Abitibi, MANFOR and other private forestry operators, and private individuals.

The discussion does not include the provincial and winter road systems, nor municipal road systems. Additionally, certain bridges and similar structures on municipal roads are administered by the Department, but these are not included.

2. Road Administration

At the present time within the Department, there is no single administrative structure for resource and recreation roads. A variety of approaches are followed with several branches having various responsibilities. No major problems have been encountered.

The need for a new road or road redevelopment and upgrading is normally identified by a resource branch - Water Resources, Forestry, Wildlife or Parks. The Regional Services Branch may also bring forward recommendations. The initiative may come from branch field or management staff. The branch provides the justification for the road project, prepares cost estimates - usually with the assistance of the Engineering and Construction Branch, and includes the project within its budget estimates. Within this process, discussions about the project may, and usually do, occur between proponent staff and the various other branches. The proponent branch may also consult with other government agencies or the public. The consultation is usually informal and there are no hard and fast rules as to when consultation, either within or external to the Department should occur. If the consultation process is followed, conflict resolution appears to occur most often at the staff level.

Most resource road construction involves a more or less permanent disposition of the land and must be recorded in the Crown Land Registry. The exceptions may include such short-lived facilities such as a primitive road to access a stand of timber.

Approval to build roads on Crown land can come from various sources. If the land is encumbered, such as a provincial forest, wildlife management area, provincial park, public shooting ground or the like, then the responsible branch director has the authority, usually through a permitting process, to authorize and control development.

If the land is unencumbered Crown land, the road developer must request approval from the Director of Lands. If the developer is a branch of the Provincial Government, no permit is issued. Instead, a reservation is granted.

If the developer is outside of government, an application for a permit must be filed to trigger the land disposition process. If the Director of Lands approves the application to construct a road, a lease or permit is issued, usually with conditions. A legal survey may be required for a lease if the road is a permanent facility of substantial importance.

Road development by MANFOR and Abitibi is covered by the respective timber agreements. Normally, major road project proposals are circulated to Departmental regional staff, in concert with the 5-year timber cutting plans and not as separate entities. Collector and local access roads are not usually circulated or identified. Location of MANFOR and Abitibi roads are seldom established by survey or recorded in the Crown Lands Registry, as required.

Road development by concessionaires in parks or by small timber operators is administered under the authority of specific resource legislation. Lands Branch is seldom involved and thus locations are not recorded, nor projects circulated. Branch staff who monitor the resource user may consult with other resource interests, if problems are apparent, but there is no obligation to do so.

The Director of Surveys may require that a road be surveyed particularly if it is adjacent to patented land, a major road or may be used as an administrative or jurisdictional boundary.

Construction/Maintenance

Depending on the type and function of the road, a proponent branch may plan, locate, design, construct and operate the road independently. If the road has specific design needs, the branch may retain the engineering assistance of the Engineering and Construction Branch. Engineering advice is usually obtained if there are:

- Topographic or structural problems.
- Professional design requirements to meet Provincial standards.
- Requirements from the Department of Highways.
- Excessive workloads, and staff in the initiating branch are not available to oversee the project.

Road maintenance is commonly undertaken through Departmental work orders by the Regional Services Branch on behalf of a resource branch, using Departmental equipment. In some cases, however, a resource branch may contract with a private firm, a municipality, or with the Department of Highways to meet maintenance needs. Regional Services Branch is usually consulted on these matters, or may administer the contracts.

Abitibi and MANFOR have staff assigned to develop and maintain resource access roads. Roads are normally built and maintained to minimum safe standards. If the road project is cost-shared, higher standards may be required to meet provincial objectives. The Engineering and Construction Branch may be involved on cost-shared projects.

Private roads on Crown land are normally built and maintained by the individual user.

3. Road Classification

The purpose of this section is to describe a road classification system which can be applied to the management of Department of Natural Resources roads, and which, at the same time, can be readily communicated to the public.

The following classes of roads are proposed:

Resource Road:

This class of road includes those better quality facilities which provide regional access to recreation or resource uses, developments, and opportunities. These roads have the most traffic volume, the highest design speeds and the longest design life. Construction and maintenance standards are also the highest.

Resource roads may be constructed for a single purpose, such as for forestry operations, hydro-electric developments or to provide access to new parklands, but they often provide for a number and wide variety of uses.

Public access may be restricted if there are user conflicts, or dangerous conditions.

Resource Trail:

This road class identifies those facilities which provide access to specific resource or recreation use areas - e.g., a cottage subdivision, a forest cutting area and the like. Use is normally seasonal. Traffic volumes may be substantial depending upon the primary use. Therefore, construction and maintenance standards may have to be quite high in order to maintain acceptable public safety levels.

Service Trail:

This class of resource road identifies those facilities which provide direct access to specific resource or recreation developments or use activities. Construction and maintenance standards are seldom a factor in the development and operation of these roads, although public safety must be maintained.

Earthen Pathway:

These roads provide direct access to the land but are constructed on the ground surface. No excavation, ditching or grading is provided. Under certain conditions, an improved road surface may be provided, e.g., gravel may be provided in a wet area.

These facilities have a short lifespan and the public would not normally have access.

Table #2 summarizes the primary characteristics of each road class.

Table 2. Summary of General Characteristics Normally Associated with each Road Class.

Characteristics \ Road Class	Resource Road	Resource Trail	Service Trail	Earthen Pathway
Period of Use	Year-round, or no winter use	Year-round or no winter use	Summer Season	Winter or dry weather only
Lifespan	Long-term	5-10 years	1-5 years	Short-term
Vehicle restrictions	All licensed vehicles	All licensed vehicles	Single Purpose vehicles	Specialized vehicles
Resource Use	Multiple	Primary use to secondary uses	Single	Single
User Groups	Public	May be restricted, or limited public use	May be restricted	Restricted
Construction Standards	High	May be high	Low	None
Maintenance Standards	High	May be high	Low	None
Access to adjacent land	Limited, may be controlled	Resource area	Unlimited	Unlimited
Annual Maintenance Cost Ranges	$500 ±300/km	Less than $500	Less than $300	$Ø

4. Road Management Guidelines

The following guidelines are proposed for resource and recreation roads to assist road managers. The guidelines are based upon an estimate of daily vehicle traffic: high (75 vpd or more), medium (50-75 vpd) and minimum (less than 50 vpd) and using various design speeds. No guidelines are proposed for Earthen Pathways.

An estimate of cost to maintain per kilometer is provided as a general guide.

Table 3. Resource Road Development Guidelines

Resource Road Quality	Design Speed[1] km/h	Clearance[2] (m)	Road Surface[3] (m) width	Ditching	Max Grade	Max Degree Curvature	Maint. Cost[4]
High	90	40	9	1:4	8%	7°	$1400
	60	20	8	1:4	10%	12°	
Medium	90	35	8	1:3	10%	7°	$1200
	70	25	6	1:3	12%	10°	
	50	12	6	1:3	12%	12°	
Minimum	50	12	5	1:2	12%	20°	$890
	30	10	5	1:2	12%	-	
	20	8	4	NA	15%	-	
	Less than 15	6	3	NA	15%	-	

[1] Design Speed in kilometres per hour.

[2] All measurements are metric

[3] All weather roads, minimum top thickness of 'A base gravel' is 150mm; for summer only - 100mm

[4] Cost per kilometre in 1983 based upon achieving minimum standards. Actual costs for resource roads is estimated at $500 ± $300 for the Province.

The following additional guidelines should be followed:

1. For all new construction or upgrading of Resource Roads or Resource Trails, the proponent branch will prepare a Road Impact Report. The purpose of the report is to describe briefly the project including costs and benefits, to identify issues and resource conflicts, and to document any consultation.

   This report will be submitted during the capital review process.

2. Regional resource specialists should be consulted by the proponent branch during the road planning process, beginning at the earliest stage possible.

3. The Regional Services Branch local managers will co-ordinate and manage maintenance, and, as necessary, road construction with appropriate professional engineering input from Engineering and Construction Branch.

4. The anticipated road load will determine the design loading of all bridges and structures.

5. Roads Maintenance Strategy

The purpose of this section is to describe a strategy and exact tasks which Regional Managers, and others who have departmental responsibilities for roads, might follow as a guide for road maintenance and upgrading. The emphasis of the strategy is on ease and rapidity of use, low application cost, and accuracy in setting out departmental road maintenance priorities. In this respect, the strategy may be considered as a type of applied 'cook book' approach to road maintenance.

A secondary but no less important value of the strategy is that it provides a record of road maintenance and analysis in a standard format.

5.1 Background

At the present time departmental road maintenance needs are established informally. In the first instance, staff - usually Natural Resource Officers or management staff of the Regional Services Branch drive each road and compile a list of maintenance requirements. Secondly, complaints received from the public or user groups are recorded and answered in the order of placement, or matched against overall departmental needs.

Over the years this approach has worked reasonably well. However, with limited maintenance and capital funds, this does not always provide for the most effective use of these limited resources. There is a need for an objective and consistent approach for evaluating and priorizing relative maintenance needs, since there are clearly not enough funds at a given point in time to maintain all roads. The objective is to provide a strategy which will assist departmental road managers to determine where and when a road should be repaired, or upgraded, and the relative priority of these maintenance activities. This strategy is not, however, to be used as a substitute to good management and judgment.

Three road maintenance categories are proposed, as follows:

1) No maintenance required within current fiscal year.
2) Requires maintenance within current fiscal year.
3) Needs upgrading or reconstruction to original standard - minor maintenance not cost effective.

5.2 The Survey[1]

This section describes the activities and the forms to be used in the strategy.

The survey phase is based upon a regional survey team of two departmental staff who are familiar with road construction and maintenance, and with the regional road system and associated traffic patterns. One drives and observes for the left side of the vehicle; the other records for both observers and evaluates the right side. All evaluations are compiled on the inventory data forms.

When first applying this approach, care must be used to ensure that the strategy is not used to justify preconceived needs, or lack of needs. In order to establish departmental priorities, all roads or trails which have a high level of use, an important economic role or people and property protection function and which are likely to need repairs, should be identified as priority inventory candidates.

Boundaries and starting points should be established before the inventory begins so that the road evaluators will be able to determine the exact location of maintenance needs. Boundary points may be established using: limits of past or present construction projects, changes in road design, changes in road surface and geographical or political/administrative boundaries.

The strategy utilizes 6 forms:

1) Data Summary Form
2) Maintenance Inventory Form for Gravel Roads
3) Maintenance Inventory Form for Paved Roads
4) Scoring Key - Gravel Roads
5) Scoring Key - Paved Roads
6) Regional Summary Sheet

The Road Data Summary Form (Figure 1)-records location and the level of adequacy of the road. Road location can be described by name - e.g., Roger's Pass Road, Section F campground service road, intersections, boundaries or starting points, and range and township or legal subdivision. It is important to relate road location to the section being inventoried.

Function Adequacy information recorded includes:

- roadway width as measured from top of shoulder to top of shoulder.
- number of lanes.
- road class - resource road, resource trail, etc.
- median width if one exists (estimate only).
- estimated daily traffic where possible. Seasonal peaks should be noted, or year round.

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[1] The process presented is based in part on a study prepared for the National Science Foundation, Engineering and Applied Science. Stephen Biles, Richard Kerbel. A Training Manual for Setting Street Maintenance Priorities. Texas Innovation Group. College Station Texas, August, 1979.

Figure 1.

Road Data Summary Form

Date _____
Total Distress Points _____
Maintenance Category: ____ No remedial work.
____ Requires remedial work.
____ Requires reconstruction.
____ Maintenance not effective.

Location

Region: _____

Road Name (if applicable): _____

Location: Section _____ Twp. _____ Range _____

From kilometre _____ to kilometre _____

Length (km) _____ (to nearest tenth)

Road Class: _____
(resource road, resource trail, etc.)

Function Adequacy

Roadway width _____ metres No. of lanes _____

Surface: Gravel _____ Flexible Pavement _____

Ditching: Yes _____ Culverts: Yes _____ Bridges: Yes _____
No _____ No _____ No _____

Est. Daily Traffic _____ (Vehicle per day) Seasonal _____ (specify)
Year Round _____

Structural Adequacy

Date of Construction _____ Date of Last Maintenance _____

Date of Reconstruction/Upgrading _____ Surface _____

Degree of Vehicle Difficulty _____ Seal Coat _____
(code)

Comments _____ Crack & Joint _____

_____

_____

. drainage should be noted where there is ditching, gutter, and bridges and culverts.

Structural Adequacy information includes:

. date of construction, or upgrading.
. date of last major maintenance - gravelling, grading, ditching.
. degree of vehicle difficulty.

Additional comments may address specific needs such as adequacy of signing and posting, railway crossings or conditions which are dangerous to the travelling public and road users.

Evaluating degree of vehicle difficulty (DVD) is a subjective process which will identify the overall quality of the road. The survey team will complete this section after completing the traverse of the particular section of road. Each section is ranked according to the following:

1. No or minimal difficulty in driving at design speed.
2. Some roughness, or bumpy ride but no safety hazard.
3. Some difficulty to keep control of the vehicle. Speed may have to be substantially reduced.
4. Impossible to maintain the speed limit.
5. Road is impassable to all highway-type vehicles, except four-wheeled drive.

The purpose of the above information is to assist the Regional Manager in his evaluation of priorities if maintenance ranking shows various roads to be in essentially the same condition.

The Maintenance Inventory Form for Gravel Roads (Figure 2) is to be used when evaluating gravel roads. This form provides the raw data for making later decisions about road maintenance. Seven types of distress conditions for gravel roads are noted as follows:

. Rutting
. Washboard
. Unstable fills
. Inadequate cross drainage (Ponding)
. Insufficient gravel thickness
. Insufficient clearing

Each of these conditions will be rated by severity. In order to maintain a consistent evaluation the standard definitions should apply. (See Appendix I)

The Maintenance Inventory Form for Flexible Pavements (Figure 3) is to be used when evaluating bituminous surface roads. Eight types of road distress conditions are noted, as follows:

. Rutting
. Raveling
. Flushing
. Corrugations
. Alligator Cracking
. Transverse Cracking
. Longitudinal Cracking
. Patching

Figure 2

Gravel Roads Inventory Form

Total Distress Points _____

Road Name: _____

Location: Section _____ Twp: _____ Range: _____

From Kilometre _____ to Kilometre _____

Degree of Vehicle Difficulty: (check one) 1.○ (low) 2.○ 3.○ 4.○ 5.○ (impassable)

Type of Distress	Degree of Distress	Percentage of Area/Length		
		less than 15%	15-30%	over 30%
Rutting	Slight			
	Moderate			
_____ score	Severe			
Washboard	Slight			
	Moderate			
_____ score	Severe			
Unstable Fills	Slight			
	Moderate			
_____ score	Severe			
Inadequate Cross Drainage	Slight			
	Moderate			
_____ score	Severe			
Insufficient Gravel	Slight			
	Moderate			
_____ score	Severe			
Insufficient Clearing	Slight			
	Moderate			
_____ score	Severe			

Figure 3

Flexible Pavement Inventory Form

Total Distress Points _____

Road Name: _____

Location: Section: _____ Twp: _____ Range: _____

From Kilometre _____ to Kilometre _____

Degree of Vehicle Difficulty: 1.○ (low) 2.○ 3.○ 4.○ 5.○ (impassable)

Type of Distress	Degree of Distress	Percentage of Area/Length		
		less than 15%	15-30%	over 30%
Rutting	Slight			
	Moderate			
_____ score	Severe			
Raveling	Slight			
	Moderate			
_____ score	Severe			
Flushing	Slight			
	Moderate			
_____ score	Severe			
Corrugations	Slight			
	Moderate			
_____ score	Severe			
Alligator Cracking	Slight			
	Moderate			
_____ score	Severe			
Transverse Cracking	Slight			
	Moderate			
_____ score	Severe			
Longitudinal Cracking	Slight			
	Moderate			
	Severe			
_____ score				
Patching	Slight			
	Moderate			
_____ score	Severe			

5.3 Priorizing

Once the survey inventory has been completed, the Total Road Distress Scores are tabulated according to the scoring key presented in Figure 4 and Figure 5, for each section of road. The scores are transferred to the Road Data Summary form and categorized as follows:

Total Distress Points	Category of Maintenance
0-15	1. No remedial work in current fiscal year.
16-75	2. Remedial work needed in current fiscal year.
76 or more	3. Major upgrading or reconstruction needed or road closure. Maintenance not cost effective.

Figure 4 - Scoring Key for Gravel Roads

Type of Distress	Degree of Distress	Percentage of Area/Length		
		less than 15%	15-30%	over 30%
Rutting	Slight	0	2	5
	Moderate	5	7	10
	Severe	10	15	20
Washboard	Slight	0	2	3
	Moderate	5	7	10
	Severe	10	15	20
Unstable Fills	Slight	2	5	8
	Moderate	8	10	12
	Severe	12	18	20
Inadequate Cross Drainage (Ponding)	Slight	0	2	4
	Moderate	4	7	10
	Severe	10	14	18
Insufficient Gravel	Slight	1	3	6
	Moderate	6	9	12
	Severe	12	18	20
Insufficient Clearing	Slight	0	0	2
	Moderate	2	4	6
	Severe	6	8	10

Figure 5 - Scoring Key for Flexible Pavements

Type of Distress	Degree of Distress	Percentage of Area		
		less than 15%	15-30%	over 30%
Rutting	Slight	0	2	5
	Moderate	5	7	10
	Severe	10	15	15
Raveling	Slight	5	8	10
	Moderate	10	12	15
	Severe	15	18	20
Flushing	Slight	5	8	10
	Moderate	10	12	15
	Severe	15	18	20
Corrugations	Slight	5	8	10
	Moderate	10	12	15
	Severe	15	18	20
Alligator Cracking	Slight	5	10	15
	Moderate	10	15	20
	Severe	15	20	25
		S PS NS	S PS NS	S PS NS*
Transverse Cracking	Slight	2 5 8	3 7 10	3 7 12
	Moderate	5 8 10	7 10 15	7 13 15
	Severe	8 10 15	10 15 20	12 15 20
Longitudinal Cracking	Slight	2 5 8	3 7 10	3 7 12
	Moderate	5 8 10	7 10 15	7 13 15
	Severe	8 10 15	10 15 20	12 15 20
Patching	Slight	-	2	5
	Moderate	5	7	10
	Severe	7	15	20

*S - Sealed
PS - Partially Sealed
NS - Not Sealed

Next, the results for each category would be summarized for the Region, as follows:

Figure 6 - Regional Gravel Road Maintenance Summary
No Maintenance Needed.

Road Designation	Boundaries From	Boundaries To	Length (km)	Class	Date Constructed	Date Maint.	Est. Daily Traffic	DVD	Distr. Points
Forest Rd 26	10.2	17.5	7.3	Res.Rd.	63/09	83/08	50	1	11
Whiteshell Rd. 2	Campground		1.5	Ser.Rd.	71/05	82/07	15	1	8

Figure 7 - Regional Gravel Road Maintenance Summary
Maintenance Needed

Road Designation	Boundaries From	Boundaries To	Length (km)	Class	Date Constructed	Date Maint.	Est. Daily Traffic	DVD	Distr. Points
Forest Rd 20	6.5	14.7	8.5	Trail	59/06	83/09	75	3	73
Park Entrance	0	10.5	10.5	Res.Rd.	70/04	84/04	550	3	72
Pelican Bay	Subdivision 6123		2.1	Ser.Rd.	69/05	03/06	5	3	59

Similar tables would be prepared for:

- Regional Gravel Road Maintenance Summary Major Upgrading
- Regional Paved Road Maintenance Summary No Maintenance
- Regional Paved Road Maintenance Summary Maintenance Required
- Regional Paved Road Maintenance Summary Major Upgrading Required

Maintenance priorities could be assigned to departmental roads as follows:

- repair those roads with the highest distress points.
- choose resource roads over trails, etc.
- choose to upgrade older roads, or heavily used roads first.
- repair only those roads with the highest distress point and poor DVD scores.

5.4 Estimating Costs

The Engineering and Construction Branch has estimated maintenance costs, based on achieving minimum standards. (See Table 3)

There is some empirical evidence, based on the fact that many departmental roads do not achieve minimum standards, that the actual maintenance cost for most resource and recreation roads is much lower. Therefore, for estimating purposes only, \$500 ± \$300 may be used as a guideline to estimate costs. The number of distress and the DVD score points may provide some guidance. A low number of distress points may suggest maintenance cost ranges of \$300, while high values may be associated with higher costs. Experience and judgment must be used. Major upgrading appears to range from a high of \$40,000 per kilometre to a low of \$21,000 per kilometre. Therefore, utilizing these data the following estimates can be made on a regional basis.

Figure 8 - Estimating Regional Road Maintenance and Upgrading Costs

Road Designation	Boundaries From	Boundaries To	Length (km)	Distress Points	Est. Cost/km	Total Est. Cost (\$s)
Forest Rd 26	10.2	17.5	7.3	74	500	3650
	22.0	22.5	.5	75	500	250
	34.5	37.5	3.0	68	475	1425
	41.5	48.3	6.8	42	375	2550
Park Serv. Road	12.6	14.2	1.6	112	27,000	43,200

5.5 Recommendations

1. The Regional Services Branch local manager in each of the department's regions should coordinate the preparation of all road maintenance in their respective region.

   It is important that the survey and evaluation be consistently applied if it is to be of value to the decision makers. Therefore, in view of present responsibilities for road maintenance management, the local manager position would appear to be the logical focus for this road survey and evaluation process.

2. The survey should be conducted on an annual basis.

   Road conditions are constantly changing and the inventory must be kept up to date. Natural Resource Officers could include the road survey as part of their overall patrol responsibilities, particularly in remote areas.

3. The regional road budgets should be based on the survey results. If this is not implemented, the staff efforts needed for the survey will be of little value.

4. Regions should compare inventory and costing data on a regular basis.

6. Posting and Signing

As a general guide, signing and posting should follow the departmental sign manual - Manitoba Regulation 101/77, filed 24th May, 1977.

The revised manual advances a departmental approach to signs which incorporates provincial and international standards. Design, construction and maintenance standards are described in considerable detail. On matters relating to public safety, it is important to follow these standards to avoid confusion and to ensure that the proper message is presented.

The following guidelines for signs and postings are recommended:

1. All traffic regulation signs should be installed in accordance with the specifications set out in the departmental Sign Manual.

2. Sign condition surveys should be made at least periodically.

3. Regulatory and warning signs that need replacement shall take priority over all others.

7. Mapping and Publication

At the present time information on departmental roads is readily available from a variety of sources including: National Topographic Series (various scales), forest inventory base maps, maps of order-in-council areas - parks, wildlife management areas, provincial forests, etc.

Some problems have been reported in the past with roads identified on NTS maps and forestry inventory base maps. Although these roads may have been major facilities, there is no assurance that they are being maintained today. Members of the public not familiar with this information have had problems either in damage to vehicles or inconvenience.

As a general guideline, departmental roads which are not maintained, or which have a high "degree of vehicle difficulty" should not be mapped.

7.1 Recommendation

It is recommended that a master map of resource and recreation roads and trails should be prepared, by the Regional Services Branch at headquarters as part of their on-going responsibilities, and updated at 5-year intervals. The map and road codes would be used as the common reference for all departmental publications of maps, parks brochures, and so forth.

Co-ordination with the Surveys and Mapping Branch would be required.

Appendix I - Standard Definition for Distress Conditions

A. Gravel Roads

Type of Distress: Rutting

Definition: An obvious depression in the road surface which parallels the shoulder of the road.

Factors in Determining Severity:

Slight - depression is less than ½ inch (12.7mm) deep
Moderate - depression is ½ inch to 2 inches deep but does not interfere with vehicle steering
Severe - depression is deep enough to adversely affect vehicle control and safety.

Type of Distress: Washboard

Definition: Obvious ripples in the road surface which are perpendicular to traffic direction.

Factors in Determining Severity:

Slight - ripples are visible
Moderate - ripples create a bumpy ride but do not require a substantial reduction in speed in order to maintain vehicle control
Severe - ripples are significant enough to require a substantial reduction in vehicle speed in order to maintain control.

Type of Distress: Unstable Fills

Definition: Poor drainage, easily eroded materials and slope all work to cause the undermining of the road.

Factors in Determining Severeity:

Slight - barely noticeable visually or in vehicle ride
Moderate - erosion is severe enough to expose portions of the road bed
Severe - the road bed is totally exposed and cannot be utilized except at very low speeds.

Type of Distress: Inadequate Cross Drainage (Ponding)

Definition: Water drains over road causing scouring.

Factors in Determining Severity:

Slight - road scouring is noticeable but vehicle control and safety are not adversely affected
Moderate - scouring causes deterioration of road surface to the point that major portions of the road bed are exposed
Severe - road has been so severely scoured that vehicle passage is possible only at slow speeds, if at all.

Type of Distress: Insufficient Gravel

Definition: Gravel thickness on resource roads is less than required or where the road subgrade oozes to the surface.

Factors in Determining Severity:

Slight - gravel thickness is less than desirable but the subgrade is not exposed.
Moderate - subgrade is exposed and some bumpiness is experienced.
Severe - subgrade is exposed over most of the road surface and the ride is so bumpy that vehicle control may be compromised.

Type of Distress: Insufficient Clearing

Definition: Vegetation clearing overloads bank crests, plugs ditches, allows snow to accumulate or adversely affects vehicle speed and safety through reduced visibility.

Factors in Determining Severity:

Slight - vegetation only slightly affects vehicle speed and safety
Moderate - vegetation and tree growth is significant to the point that vehicle speed must be reduced to maintain safe driving conditions
Severe - Vegetation and tree growth is so extensive that safe vehicle speeds are less than 20% of design speed or less than 5km per hour. Vegetation will likely overhang the road surface.

B. Flexible Pavements

Type of Distress: Rutting

Definition: An obvious depression in the pavement parallel to the shoulder of the road.

Factors in Determining Severity:

Slight - depression measures less than ½ inch deep
Moderate - depression measures about ½ to 1 inch in depth, but is not deep enough to prevent easy control of vehicle
Severe - depression is so deep that vehicle control and safety may be adversely affected.

Type of Distress: Raveling

Definition: A breaking of the road surface with visibly loose pieces of aggregate.

Factors in Determining Severity:

Slight - a few pieces of aggregate are visibly dislodged from the pavement and are loosely sitting above the road surface
Moderate - pieces of loose aggregate are present enough to cover wide areas of the road surface
Severe - pieces of loose aggregate are so prevalent that they cause the road surface to be rough enough to be noticeable when driving a vehicle over the road.

Type of Distress: Flushing

Definition: Asphalt covers the aggregate.

Factors in Determing Severity:

Slight - asphalt is barely noticeable in its covering of the aggregate
Moderate - asphalt is covering large areas of the aggregate
Severe - asphalt is totally covering the aggregate.

Type of Distress: Corrugations

Definition: Ripples are visible in the pavement perpendicular to traffic direction

Factors in Determining Severity:

Slight - ripples are visible
Moderate - ripples create a bumpy ride but do not require a reproduction in vehicle speed
Severe - ripples are prevalent enough to require the vehicle to reduce speed in order to maintain control.

Type of Distress: Alligator Cracking

Definition: Cracks are in the pavement in a pattern similar to an alligator's skin or chicken wire.

Factors in Determining Severity:

Slight - cracks are barely visible
Moderate - cracks are more than ¼ inch wide (6.35mm) in some places, but the sides of the cracks are not fully separated.
Severe - cracks are wide enough that the sides are fully separated.

Type of Distress: Transverse Cracking

Definition: Cracks are in the pavement perpendicular to the direction of traffic.

Factors in Determining Severity:

Slight - cracks are barely visible
Moderate - cracks are more than ¼ inch wide in some places, but the sides of the crack are not fully separated
Severe - cracks are wide enough that the sides of the crack are fully separated.

Type of Distress: Longitudinal Cracking

Definition: Cracks are in the pavement parallel to the direction of traffic.

Factors in Determining Severity:

Slight - cracks are barely visible
Moderate - cracks are more than ¼ inch wide in some places, but the sides of the crack are not fully separated
Severe - cracks are wide enough that the sides of the crack are fully separated.

Type of Distress: Patching

Definition: Potholes, or other major failures in the road surface which have been repaired.

Factors in Determining Severity:

Slight - patch is level with the pavement and shows no sign of deterioration
Moderate - patch is somewhat deteriorated but not enough to require a vehicle to reduce speed
Severe - patch is deteriorated enough to require a reduction in vehicle speed in order to maintain control; also includes a pothole which has not been repaired.

For each type of distress, the degree of severity and an estimate of percentage of the road area (length) is recorded on the appropriate inventory form. The appropriate Data Summary Form and Inventory forms are to be stapled together.